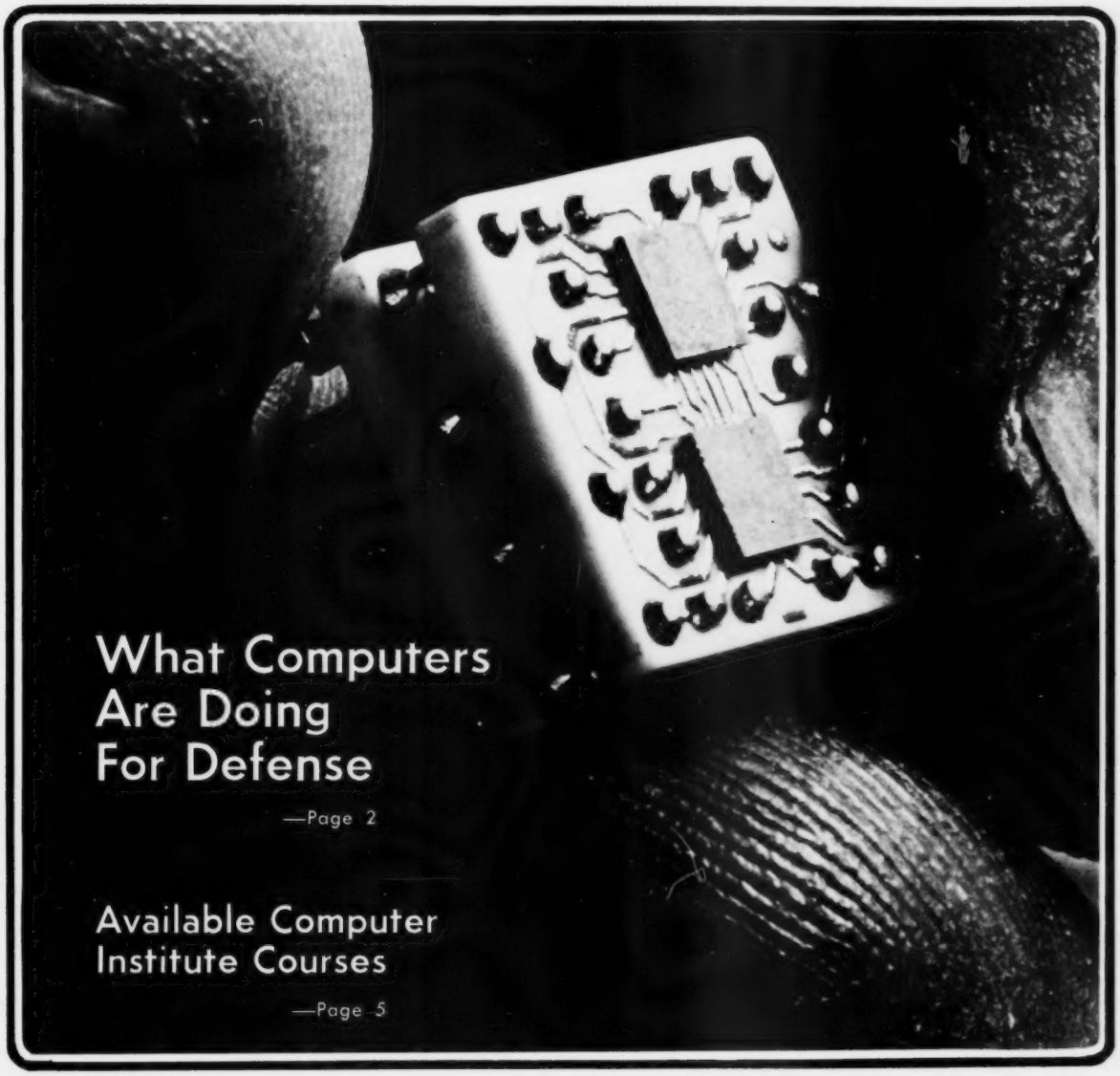
COMMANDERS DIGEST

DoD ADP Activities

VOL. 13, NO. 33/JUNE 21, 1973



What Computers Are Doing For Defense

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Scientific and Technological Information

What Computers Are Doing for Defense

This new "virtual storage" computer system can be operated as a single system—or as two independent computers. (IBM Photo)

The 28 years following the end of World War II have brought to the Department of Defense (DoD) a tremendous increase in scientific and technological information. Spurred by that development came innovations for breaking down data and information and rearranging it in such ways that it could be easily understood and interpreted.

One of world's first all-electronic computers was developed and built by the U.S. Army in 1946 and put into operation at the Aberdeen Proving Ground the following year. Since that time, the use of computers has expanded at an explosive rate. Today, almost every facet of business in DoD depends upon computer technology for its support. The greatest impact of automated data systems supported by the computer has been felt since about 1958, even though the computer was introduced in DoD 12 years earlier. Its impact on methods of doing business by computers in DoD is similar to that of nuclear weapons on military strategy. The computer is the culmination of age-old attempts to improve our capabilities to process data and information.

On June 28, 1966, the late President Lyndon B. Johnson directed Federal agencies to explore and apply all possible means to: 1) use the electronic computer to do a better job and 2) manage computer activity at the lowest possible cost. To implement the President's directive, former Defense Secretary Robert S. McNamara developed a seven-point plan which would:

- Take advantage of the tremendous capabilities of the computer for data collection and analysis;
- Develop and install standard data systems within DoD at a level far exceeding existing practices;
- Develop and issue system specifications;
- Make competitive computer evaluation and selection a professional endeavor;
- Select and acquire new or replacement computers only after systems have been redesigned to make full use of the improved capabilities of later hardware;
- Conduct regular reviews and audits of computer system development and programming and computer operations throughout DoD to control costs and identify areas for standardization action; and
- Obtain the most favorable automatic data processing costs in

INSTRUCTOR CONSOLE—A Navy petty officer operates an instructor's console at the Pacific Fleet Air Electronics Training Unit, North Island, California, Naval Air Station. (U.S. Navy Photo)

DoD's cost reimbursement-type contracting.

Since President Johnson's 1966 directive, the DoD Automatic Data Processing (ADP) Program has increased from 1,967 computers, a $742,241 budget and 50,391 personnel to a projected 1973 program of 3,700 computers—not including 12,000 other special and general computers used to support operational and weapon systems—a $1.5 billion budget and 77,370 personnel. Today, the Department's ADP Program represents approximately 60 percent of the computers in the Federal Government.

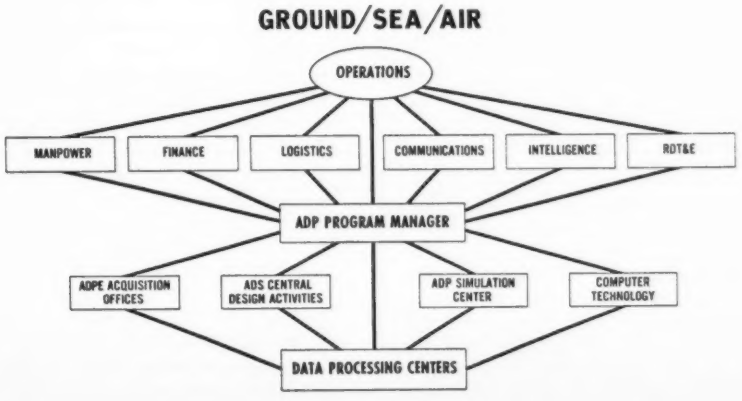
The DoD ADP Program increases effectiveness by providing management with the latest possible information for decision making. Information in huge quantities must flow smoothly to decision makers if large systems are to be properly managed.

The evolution of ADP management in DoD has paralleled generally the evolution of automated data systems themselves. To illustrate—in stage one of the data system evolution, each post, camp, station, base, depot and headquarters element was "doing its own thing" by designing, developing and implementing its own unique data system. Likewise, the management of ADP resources, if and when centralized at all, was centralized mostly at the intermediate command and later at the Departmental levels.

In stage two, data systems within each DoD Component were standardized with strong Component-wide ADP management at the Departmental level, pursuant to policy guidance from the Office of the Secretary of Defense (OSD) level. Hopefully, in stage three, there will be more of the DoD-wide standardized data systems under the policies, guidance and review of agencies at the OSD level. The ADP management will likewise become more highly centralized at the OSD level.

In recent years, the greatest influences on DoD ADP management organization, policies and operations are those of the Office of Management and Budget (OMB) and the committees and subcommittees of the Congress. Of primary importance is the "Brooks Subcommittee" of the House Government Operations Committee, which was responsible for PL 89-306, an Act to provide for the economic and efficient purchase, lease, maintenance, operation and uitilization of ADP equipment by Federal departments and agencies.

Through system acquisition controls and imposition of total ADP ceilings, OMB has made it necessary for Federal agencies to tighten their ADP management policies and controls. Through the requirements for economic analyses, consolidation, improved data system review, combination of computer installations, and insistence on software standards adoption, the Congressional committees and subcommittees have been very influential in helping to shape the DoD ADP management program.



ADP Management Organization

At the top of the DoD ADP organization is Army Colonel William W. Higgins, Deputy Comptroller for Data Automation, in the Office of the Assistant Secretary of Defense (Comptroller).

The ADP Systems Review Group, which consists of representatives from the Office of the Secretary of Defense (OSD) functional staff, is responsible for recommending standardization of functional data systems and for review of those systems to assure adherence to policies and guidance as well as operational effectiveness.

An ADP Policy Committee, consisting of members from the Components as well as the OSD staff, is responsible for participating in the development and coordination of ADP policy matters.

At the Component level, a senior ADP policy official has been designated, and in most cases, he is the Assistant Secretary for financial management. The component ADP program manager is identified by different titles and is located in different offices.

The Army office is known as the Directorate of Management Information Systems and is located in the Office of the Assistant Vice Chief of Staff. The present Director is Major General Robert L. Fair.

The Navy office is designated the Information Systems Division, called OP-91, and is located in the Plans and Programs Office under the Chief of Naval Operations. The present incumbent is Rear Admiral Frank S. Haak.

The Air Force office is known as the Directorate of Data Automation, located in the Office of the Comptroller. The present Director is Major General Jack B. Robbins.

The Marine Corps office is designated Data Systems Division. The present incumbent is Colonel Jerry F. Mathis.

To ensure objective and competitive computer systems acquisition and to maximize the use of talent, the Services have centralized their computer selection activities. Several of the components have also established central systems design and development activities to improve the design, development, programming, implementation and operation of data systems by utilizing more fully the available but scarce manpower resources.

Spurred on by the need for greater efficiency, there are three prototype regionalizations of computer facilities projects underway in three Services. At least one of those projects contemplates regionalization across Service lines.

DoD is constantly seeking to combine data systems at regional computer locations to do the best possible job with the smallest amount of resources. In cooperation with and under formal agreement among the National Bureau of Standards (NBS) and the General Services Administration (GSA), DoD has established a Federal Computer Performance Evaluation and Simulation Center (known as the FEDSIM) and has extended the DoD Common Business Oriented Language (COBOL) Compiler Validation Service to all Federal Government Agencies (now known as the Federal COBOL Compiler Validation Service).

ADP Program Management

Top management intends to establish a document which will indicate how far the ADP Program has progressed and where it is going. DoD expects to summarize information on systems being developed and operated, and to inventory systems by location.

ADP management is now decentralized to the maximum extent possible. For the acquisition of individual systems, the management cycle begins with a feasibility/economic analysis, followed by a management plan for the alternative selected. Major milestones are designated as the system is designed, developed, tested and implemented. The final step in the management cycle is a post-installation management audit to compare accomplishments against planned objectives.

User-managers have a great responsibility for participation in decisions relating to ADP systems. Where data processing has a significant impact on the user's organization, user-management's participation in defining the problem is vital to the following activities:

- Identification of applications;
- Definition of requirements;
- Recognition of economics;
- Acceptance of a requirements freeze during implementation;
- Establishment of controls;
- Acquisition of data processing education; and
- Participation in implementation.

Vital to the success of a system is user-management involvement with its development. Many middle- and high-level managers fear or fail to comprehend the impact of ADP. The program's problems, delays and failures are frequently attributed to a lack of user-participation. The basic decisions in systems design and development are those of the functional managers. The ADP people are in a supportive role.

DoD also is attempting to identify and apply the concept of "Productivity Incentive." The idea is to find—as an incentive to even greater productivity efforts—means of returning generated savings to the organization, through more efficient, effective and economical use of ADP resources.

Also being examined are ways and means of getting ADP and telecommunications people involved in each other's business right from the start, instead of interfacing somewhere along the line of the design and development phase.

One plan is to consider the system with preponderant interest as a "prime contractor" for the overall system, with all the other elements involved being "subcontractors." For example, if a system is essentially an ADP one, the "prime contractor" would be the ADP people with telecommunications people being a "subcontractor." Likewise, if the preponderant interest is one of weapons, and not ADP, then the weapons people would be the "prime contractor," with the ADP people the subcontractor. Both ideas are designed to do a better job of total sys-

COMMANDERS DIGEST

Vol. 13, No. 33; June 21, 1973

A publication of the Department of Defense to provide official and professional information to commanders and key personnel on matters related to Defense policies, programs and interests, and to create better understanding and teamwork within the Department of Defense.

Published weekly by the American Forces Press Service, 1117 N. 19th St., Arlington, Va. 22209, a unified activity of the Office of Information for the Armed Forces, OASD (M&RA). Reproduction of content is authorized.

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Cover Photo: A two-chip memory module, containing more than 1,400 circuit elements, used in the main memory of a new computer system. (IBM Photo)

tem integration, coordination and management.

Computers by Function

Primary functional areas directly affected by DoD's ADP Program are:

- Logistics;
- Research and development, including testing and evaluation;
- Payroll and accounting;
- Telecommunications;
- Personnel management;
- Command and control;
- Weapons and tactical systems;
- Intelligence;
- Weather;
- Civil engineering;
- Information retrieval; and
- Medical management;

When computers support multifunctional activities, the system is prorated among the functional areas being supported. Plans call for more multifunctional use of computers and a reduction in the number of "dedicated" computers.

ADP systems can be categorized into four major areas:

- Management support (logistics, manpower, financial, facilities, and medical);
- Research and development, including testing and evaluation (laboratories and test ranges);
- Operational support (command and control, communications, intelligence, weather, surveillance, and fire power); and
- Weapon system support (aircraft, missiles, tanks, and warships).

Tactical Automated Data Systems

For reasons of compatibility and commonality, ADP officials have attempted to standardize the hardware and software throughout the entire tactical community. With the Army experimenting on a Litton computer, the Navy on a Univac computer, the Marines on a general-purpose Central Data Computer and the Air Force undecided between Hughes and Univac computers, Defense-wide standardization has yet to be determined. But the Services are making every attempt to standardize within themselves.

Each Service has established a central system design activity for software development. Some basic roles and missions have to be further defined to develop a truly interactive system. It is expected that Joint Ground and Amphibious Military Operations (GAMO) and Tactical Air Control/Tactical Air Defense Systems (TAC/TADS) will help in this area.

Reutilization

Since 1965, DoD has reutilized computers worth one billion dollars. The operation is managed by the Data Automation Reutilization Office located in the Defense Supply Agency.

Before any DoD activity can acquire additional equipment, it must check with the Reutilization Office to see if like or substitute equipment is available. The Reutilization Office continually searches a data file containing an inventory of all DoD computers and provides the components with management information, such as, in a certain month, component X will be releasing a Government-owned computer Y from location Z, which could be used to replace a leased computer A at location B.

Computer Institute

To increase the professional effectiveness of military and civilian computer managers and operators, the DoD Computer Institute (DODCI) was established in 1964 to accomplish the following objectives:

- Teach the fundamentals of digital computer capabilities, limitations, and applications to senior military and civilian executives;
- Assist senior DoD military and civilian personnel in the planning and implementation of new digital computer systems and in improving existing ones; and
- Enable DoD to lessen its dependence on contractors in planning and operating computer systems.

Since its inception, about 12,000 senior and mid-management level officers and civilian executives—including more than 1,200 Flag/General officers and "super grade" (GS-16 and above) civilian officials—have attended regular resident DODCI courses in the Washington Navy Yard. Although DODCI is geared toward the senior- and mid-level manager, other courses—advanced technical—are offered for the junior executive, the ADP technical professional and ADP manager. While DODCI courses are conducted primarily for the Department of Defense, management personnel from

COMPUTER INSTITUTE OFFERS WIDE SELECTION OF COURSES

Trained computer specialists of varying expertise—literally of every grade—are a recurring personnel requirement facing all commanders. To fill that need, the Department of Defense Computer Institute (DODCI) in Washington offers a series of highly flexible training courses.

Courses offered at DODCI include:

- **Computer orientation for senior executives: for Flag/General Officers and GS-16 and above, one week;**
- **Computer orientation for intermediate executives: for 0-5/6 and GS-14/15, two weeks;**
- **Computer support for command and control systems: for 0-3/4/5 and GS-12/13/14, one week;**
- **Computer system specifications and selection: for 0-2/3/4/5 and GS-11/12/13/14, one week;**
- **Introduction to computer technology: for 0-3/4/5 and GS-12/13/14, two weeks;**
- **Computer system security: for 0-2 and above and GS-11 and above, one week;**
- **Computer performance evaluation: for 0-3 and above and GS-11 and above, one week;**
- **Computer system analysis and design: for 0-2 and above, E-7 and above, and GS-9 and above, one week; and**
- **Computer orientation for senior NCOs: for E-7/8/9, two weeks.**

Other services provided by the Institute to supplement resident courses include general ADP consulting assistance and special on-site ADP courses designed as far as possible to meet the needs of requesting organizations.

Commanders can obtain more details from:

Director
Department of Defense Computer Institute
Building 175
Washington Navy Yard
Washington, D.C. 20374

FILE SEARCH—Using this machine, a Navy data processing technician can locate and print an 8x10-inch photograph from microfilm storage in less than a minute. (U.S. Navy Photo)

other government agencies have attended on a space-available basis. There are nine regular resident courses.

Established by the Secretary of Defense under the Executive Agency of the Secretary of the Navy, the Institute functions under the sponsorship of the Chief of Naval Operations (Op-91). The DODCI staff is composed of military from all the Services and Civil Service personnel.

Problem Solving

Duplication of effort presents the biggest problem the ADP Program must overcome to accomplish its objectives with maximum effectiveness and optimum efficiency. As one top-level ADP official put it, "The Services and Defense Agencies with their own peculiar problems, are still prone to do their own thing."

Next on the list of problems to be solved is the continuing increase of software costs. A better exchange of information is needed between components. Programs should be written with more flexibility, so they can be used again.

For the first time in the history of the ADP Program, the Office of Management and Budget is imposing a funding ceiling. ADP officials have to do more with less. The result has been a slowdown in the implementation of new systems.

A lack of qualified personnel poses still another problem for ADP officials. "The people are there, but it's the highly technical person with a logical mind and initiative that's hard to come by," said one ADP official.

Computer Growth

For years, critics have complained that ADP managers are too hardware oriented. Until a few years ago, this may have been true. Today, however, ADP is systems oriented. Officials are finding out that hardware is not the predominant item. It is software—and it is costing the program billions. Since 1951, the average price of a computer has been reduced from $3 million to $375,000 and the cost of 100,000 calculations from $25.00 to .009 mills. **This is the hardware.**

But the cost to write one instruction has steadily increased to $7.25. **This aspect is the software.**

Software complexity and programmers' salaries continue to increase while the cost of hardware continues to decrease. In 1953, hardware accounted for 80 percent of the total cost of a system. Today it is about 25 percent. On the other hand, development costs, which were 8 percent in 1953, have increased to 35 percent. Operational costs, which include the maintenance of systems after development, have increased from 12 to 40 percent. But the funding ceiling which the Office of Management and Budget imposed should tend to level off the total cost figures.

To promote better interchange of information among DoD Components, particularly with respect to general utility and systems software, as well as operating systems and documentation, periodic DoD Joint ADP Conferences of Central Data Systems Design Activities have been instituted. Three conferences have now been held. The first one was in April 1972.

Following is a list of a few actions taken at the Navy Fleet Materiel Support Office (FMSO) at Mechanicsburg, Pennsylvania, concerning inter-computer software exchange and benefits:

ADP SYSTEMS

MANAGEMENT SUPPORT
- LOGISTICS MANAGEMENT
- MANPOWER MANAGEMENT
- FINANCIAL MANAGEMENT
- FACILITIES MANAGEMENT
- MEDICAL MANAGEMENT

OPERATIONAL SUPPORT
- COMMAND & CONTROL
- COMMUNICATIONS
- INTELLIGENCE
- WEATHER
- SURVEILLANCE
- FIRE POWER

RESEARCH, DEVELOPMENT, TEST, & EVALUATION
- LABORATORIES
- TEST RANGES

WEAPON SYSTEM SUPPORT
- AIRCRAFT
- MISSILES
- TANKS
- WARSHIPS

FINANCE COMPUTER—Four computers at the Fort Harrison, Indiana, Joint Uniform Military Pay System (JUMPS) facility process pay for all U.S. Army personnel around the world.
(U.S. Army Photo)

- FMSO has acquired the Air Force Operators Manual for the B3500 computer. With modifications, the manual has been implemented or is anticipated to be implemented for training and day-to-day operator use at about 15 Navy B3500 sites. A significant savings resulted for the Navy in avoiding development costs for a separate manual.
- FMSO has obtained, and implemented for use, the Air Force B3500 driver (control) programs. The driver routines have proven to be valuable for hardware checkout during the installation and shakedown of all Navy B3500 installations so far. The routines were of zero cost to the Navy.
- FMSO has also acquired and is preparing to use the Air Force patching (minor alteration) system. It is anticipated that this will contribute to the Navy's ability to respond quickly to operational program problems while preserving the integrity of the centrally prepared program library, as well as giving absolute assurance that the patches are applied to the correct version of the program and that the operating activity is using the correct program version.
- A visit to Gunter Air Force Base at Montgomery, Alabama, resulted not only in the impetus to acquire several Air Force software packages which were immediately usable by the Navy, but also to provide insights into common programming problems and the learning of programming techniques which could be applied to software areas that the Air Force and Navy do not have in common. Most of the Air Force software was not immediately usable, but awareness of the existence of Air Force software in those areas has prevented independent and duplicative software development by the Navy.
- A visit by representatives of the Air Force Data Systems Design Center, Montgomery, Alabama, to FMSO, Oakland Branch, resulted in the Air Force adoption of the Navy remote test monitor which, with modifications, is now being evaluated by the Air Force.
- Army representatives from the Army Computer Systems Support and Evaluation Center, Washington, D.C., visited FMSO in April of 1972 to discuss FMSO experiences with the use of the hardware analyzer. They were provided with results of studies, forms, measurement techniques used, and the like.
- Contact has also been established with Systems Control Office (AD/8), Data Systems Division, Headquarters, U.S. Marine Corps representatives regarding interchange of hardware analyzer techniques and measurements.
- FMSO has conducted an extended correspondence with the Army Material Command, St. Louis, on programming techniques for decoding Huffman codes used in data compression of mass storage files.
- During the past 18 months, FMSO has participated in a multi-Service standardization effort at the DOD Logistics Data Element Standardization and Management Office (LOGDESMO). As LOGDESMO standards are approved and published, it

THE ROLE OF USER MANAGEMENT

USER MANAGEMENT HAS A GREAT RESPONSIBILITY FOR PARTICIPATION IN DECISIONS RELATING TO ADPS. WHERE DATA PROCESSING HAS A SIGNIFICANT IMPACT ON USER'S ORGANIZATION, USER-MANAGEMENT PARTICIPATION AND USER PROBLEM DEFINITION ARE VITAL TO:

- **IDENTIFY APPLICATIONS**
- **DEFINE REQUIREMENTS**
- **RECOGNIZE ECONOMICS**
- **ACCEPT A REQUIREMENTS FREEZE DURING IMPLEMENTATION**
- **ESTABLISH CONTROLS**
- **ACQUIRE DATA PROCESSING EDUCATION**
- **PARTICIPATE IN IMPLEMENTATION**

'REAL-TIME' WEATHER—A data communications terminal is readied for reception of meteorological charts from the Air Force Global Weather Central computer facility. (U.S. Air Force Photo)

is FMSO's intent to use them to the maximum extent practicable in all software development and maintenance effort.

To further enhance the exchange of system and utility software and operating systems and to build on the momentum for exchange which already exists, DoD has adopted the concept of a Data System Coordinating Activity (DSCA). The concept is to identify the largest user of a specified ADP computer system, or an ADP computer system series, together with associated or related software, and to appoint the appropriate DoD Component for that ADP computer system or series as the DSCA to act as the focal point for all information concerning development, distribution and use of the designated ADP system and associated hardware.

The idea is not to waste scarce resources by actually storing, cataloging, and distributing software packages at the designated DSCAs, but merely to be a central repository for information about such software. A companion concept comes from the Data System Participating Agency (DSPA) which consists of all the lesser users of the specific ADP computer system or series and associated software identified with the DSCA. Functions and responsibilities for DSCAs and responsibilities of the DSPAs have been formulated and coordinated with all DoD Components. The Air Force, for B3500 computer systems, and the Army, for all series of IBM 360 computer systems, will be designated as the initial DSCAs.

Upon acquisition or use of any major computer systems, all DoD activities are expected to contact the designated activity in the Air Force and Army for information as to the development and availability of system software before either contracting for or developing the necessary software.

However, the DSCA: 1) will not be the mandatory source of supply of software: 2) is not the approval authority for the development, distribution or use of software by any DoD Component; and 3) will make no decisions regarding the acquisition of software by any Component.

15-Point Plan

A 15-point DoD computer management plan sets forth broad goals whose attainment can result in more effective and efficient management of the Department's ADP Program. Actions implementing those goals include analysis to determine effective and efficient policies, systems and procedures based upon consideration of mission accomplishment, systems performance, resource expenditure, and risk. The attainment of the objectives will be an evolutionary process, with the target date not yet determined.

Standardization

Components should standardize the design and development of automated data systems to the maximum extent within the Components with the major goal of developing standard DoD systems. Software and procedures supporting the systems should be standard.

The use of standard programs modules which can be augmented to satisfy individual requirements should be considered. Hardware compatibility should be accomplished when like or standard hardware is not achievable. Standard data elements and codes should be developed to facilitate interchange of information.

Both the mission requirements and any economical gains must be considered when standardizing. Instead of each Service having its own separate automated supply systems, DoD should have one.

Consolidation

All data processing installations should be consolidated to the maximum extent. Automated data systems design and development activities should be merged to insure maximum utilization of resources.

Establishment of Service bureaus and networking of computer systems should be considered. Survivability and security should be considered in consolidation ef-

forts. Instead of each installation having its own computer, regional use should be established.

Research and Development

Managers in the research and development and automatic data processing communities should closely coordinate their efforts to insure that research and development efforts support operational requirements and that there is an effective transition of those efforts from research and development to the operational environment.

The unique computer technological needs of the military establishment must be recognized. Initiative should be taken as soon as possible for those long lead-time developments which cannot be expected from normal industrial sources in the time frame required. DoD should use its technology to the maximum extent.

Support for Weapon Systems Managers

More and more complex weapon systems are supported by or have integral ADP subsystems. Component ADP Program Managers should provide technical assistance to the Weapon Systems Manager in the design and development of the automated data system, acquisition of hardware and software, and the maintenance of software after system implementation. Necessary interfaces with other systems should be provided for initial specification and design.

User Participation

Users of automated data systems have a great responsibility for participation in decisions relating to automatic data processing systems. User-managers should identify applications, define requirements, recognize economics, accept a requirement-freeze during implementation, establish controls, and participate in implementation of those systems supporting their activities.

Exchange of Information

A free exchange of ADP information, including computer programs among DoD Components and outside DoD Agencies, is to be encouraged to reduce duplication of effort. Inter-Component user groups will be established for users of like systems.

One program can be used for many purposes. If programs were written flexible enough to be adopted by functional managers in other areas, the software cost would not be a problem. Only by exchange of information can this be accomplished.

REGULATORY STRUCTURE

PUBLIC LAW 89-306	(BROOKS BILL)
OMB CIRCULARS A-54/83	ADPE ACQUISITION/MIS
ARMD SERV PROC REGS	PROCUREMENT
FED PROP MGMT REG 101-32	GOVT-WIDE ADP MGMT
DOD/GSA OPERATING PROCEDURES	MEMO OF AGREEMENT
DOD DIRECTIVE 5100.40	RESPONSIBILITIES
DOD INSTRUCTION 5010.27	ADPS MGMT
DOD DIRECTIVE 4105.55	HARDWARE PROCUREMENT
DOD INSTRUCTION 4105.65	SOFTWARE PROCUREMENT
DOD INSTRUCTION 5030.40	SHARING
DOD DIRECTIVE 4160.19	REUTILIZATION
DOD DIRECTIVE 5000.11	DATA ELEMENTS & CODES
DOD INSTRUCTION 4140.38	ADP/MIS
DOD MANUAL 7110-1-M	BUDGET

Utilization

ADP systems are acquired to support a particular mission. However, if additional system-time is available over and above a reserve capacity for mobilization or war, ADP Managers should make every effort to make the time available to other users. ADP Program Managers will insure they make maximum use of excess computers managed by Defense Supply Agency, prior to acquiring new systems.

System design should be examined and extensive use of simulation techniques and computer-performance monitors should be made to improve performance of existing systems, prior to augmenting or replacing systems. If two installations operate different computers one shift per day, one of the computers should be used two shifts per day. The other would not be needed.

In-House Development

Maximum use of in-house talent should be made to design and develop military-oriented automated data systems. For those systems developed under contract, every effort should be made to maintain the systems with in-house resources. Such efforts will be in accordance with DoD Instruction 4100.33.

Systems developed by contractors and then turned over to the military often have had to be reprogrammed because the military did not understand them. The developer of a program should follow it through.

ADP Five-Year Plan

Each Component will develop and issue a five-year ADP plan to reflect where the ADP program is and where it should go. The plan will be updated at least annually and will reflect actions being taken to attain and conform with stated objectives.

Training

Intensive training of ADP personnel should be conducted to insure staying abreast of the state-of-the-art in computer technology. User-managers will be encouraged to obtain education in the basic capabilities and problems of data processing to further aid in the design, development and implementation of their respective functional automated data systems. Components should share ADP training resources and facilities in order to reduce the cost of training.

Inventory

Every effort is being made to improve the DoD ADP inventory to reflect all general and special purpose computers other than those integral to combat weapons. A software inventory will be developed and maintained to reduce duplication of effort.

ADP Acquisition

The time and cost required to acquire automatic data processing systems will be reduced by simplifying acquisition procedures, having Central ADP Equipment Selection Offices provide consult-

This Worldwide Military Command and Control Systems computer complex is located at Reston, Virginia. (Honeywell Photo)

ing services to users during the system and equipment specification phase of the acquisition, development of standard benchmark programs, development of a standard solicitation document, etc.

Sole-source procurements will be justified by economic analysis, lower cost approach, investment in software, compatibility with other systems, technical uniqueness, operational timing and mission impairment. Total cost must be considered when determining sole-source versus competitive acquisitions.

Telecommunications

As technology advances, computers and telecommunications are becoming more interrelated. All automatic data processing systems being considered, designed and developed will address the communications requirements.

Close coordination with the telecommunications community will be accomplished and tradeoff studies regarding computer versus telecommunications capability are required to field effective, efficient and economical information systems over the projected systems' lives.

Computer Languages

Any new automatic data processing system, any automated data system undergoing substantial revision or any new automated model will be programmed or reprogrammed utilizing standard high-level computer languages, where such programming is cost effective or where the size of the system indicates its feasibility. Assembly languages should be used only to program certain specialized capabilities such as Data Management Systems executives, security software, dynamics transaction processors, etc., when computer speed is critical to the operation.

Cost Effectiveness

A major criterion for using and developing automated data processing systems will be the extent to which automation can produce tangible improvements in the economy, efficiency or effectiveness of supported functional/mission processes. A thorough cost-effectiveness analysis will be performed prior to the initiation of each major ADP development project. If an operational or new system cannot be shown to be cost effective, at least the total cost of the new development or operation will be visible.

Since a computer is a tool of management, the 15-point plan can be applied to any management activity.

Automatic data processing systems exist solely to provide responsive support to the operating and support forces. Supporting automatic data processing systems will be designed, developed, implemented and operated with that paramount fact in mind. Acceptable management dictates maximum efficiency, elimination of unnecessary duplication and common use of data systems, facilities, service, supplies, hardware, software and personnel wherever operationally acceptable and economically beneficial.

Supports Decision Making

I²S Concept Guides Marine Program

By Colonel Jerry F. Mathis
Director, Data Systems Division
Headquarters, U.S. Marine Corps

The Marine Corps Automatic Data Processing (ADP) program has been guided since 1965 by the Integrated Information System (I²S) concept. The purpose of I²S is to provide Marine commanders at all levels with a reliable, responsive information base to support decision making.

Central management of personnel resources and standardization of equipment are two methods employed by the Marines to ensure economical, efficient ADP operations. ADP applications solely serving Headquarters Marine Corps or serving multiple users are centrally designed, programmed and maintained either at Headquarters or designated field activities. This saves money by minimizing duplication of design, programming and maintenance efforts. It also leads to improved applications.

The Marine Corps uses general-purpose computers located in automated services centers (ASC) that serve all functional areas. Hardware standardization for those ASCs has made it possible to maintain effective technical direction and support of the ADP effort at minimal cost. It also has resulted in considerable savings in personnel costs—the largest single expense in any ADP program.

Supporting that central direction and control is a sophisticated ASC performance evaluation program. The program detects and corrects questionable utilization practices. It also helps identify changing requirements, which are then satisfied through asset redistribution or acquisition.

The Marine Corps is currently working on a refinement of the information system that serves its operational units in two Fleet Marine Forces located in the Atlantic and Pacific operational areas. ADP applications in the Fleet Marine Force Information System (FIS) range from fire support information to financial accounting and budget support. FIS uses third-generation ADP equipment installed in relocatable ASCs that can accompany deployed forces into forward areas.

MARINE COMPUTERS—The Marine Corps uses general-purpose computers in automated services centers to serve all functional areas. (U.S. Marine Corps Photo)

The Corps is also working on the development of teleprocessing and other means of supporting smaller deployed task forces that do not require an ASC. The Marines are also working with the Navy to improve interfaces between FIS and ADP provided by amphibious ships.

Employment of the ASC concept in the Fleet Marine Force has permitted the phasing out of command data processing platoons in the Marine divisions, aircraft wings and force service regiments. Those commands can now be supported by Force ASCs, either locally or through remote terminals.

Funds have been programmed in the five-year Defense Department plan to permit completion of FIS computer acquisition as well as timely equipment upgrading and transfer of equipment to accommodate changing ADP workloads. Additional remote terminals are planned for both the Fleet Marine Forces and the supporting establishment.

Fund requirements have also been identified for conversion to less costly, less burdensome computer output, microfilm and source data automation techniques.

Funds are also programmed to improve information flow at all levels, but especially to and within operational units, and for further integration of ADP applications.

By 1979, several Marine Corps third-generation computer systems will have entered their 14th year of continuous service. An extensive research and development effort on Marine Corps Tactical Command and Control Systems (MTACCS) will be nearing its implementation phase at about the same time. In view of this, a study is underway to determine the feasibility of utilizing a common family of computer hardware for all tactical and non-tactical applications throughout the Marine Corps. That study results from a belief that closer integration of ADP applications must be achieved to keep resource costs down. It also reflects the considered probability that hardware and software technology will make the approach technically feasible by 1979.

This $4.5 million multiprocessor computer complex at Wright-Patterson Air Force Base, Ohio, helps measure foreign technological advances. (UNIVAC Photo)

Rapid Growth

Operational Economy Is Goal of USAF Systems

By Major General Jack B. Robbins
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and Commander,
Air Force Data Automation Agency

The rapid growth in the application of computer technology experienced by most DoD components has also been experienced by the Air Force. The use of computers is so pervasive throughout the Air Force that it is indeed a unique function that does not depend in some way upon a computer.

From the time the Air Force's first general purpose computer was acquired in 1952, the inventory has grown to 1,326 general purpose computers in use by the Air Force today.

Associated with that growth has been a constantly expanding Automatic Data Processing (ADP) budget, so that the Air Force ADP budget for Fiscal Year 1974 exceeds $584 million—costs which are easily identified and documented under current budget procedures. During the same fiscal year, manpower resources involved in support of general purpose ADP will approximate 23,000 people. However, for those systems where computer elements constitute subsystems of larger operational and weapons systems, ADP costs are more difficult to isolate. This is especially true during the development and system acquisition cycle largely accomplished by contractors. Hence, the Air Force expenditures for ADP is even greater than the above figures show, and efforts are under way to identify all ADP-related costs and resources.

In the beginning, computer hardware was both expensive and visible. Hence, management attention was initially oriented in the direction of hardware. However, we now know that this easily visible part is only the tip of the iceberg. Manpower and software development costs have grown with the increasing complexity of systems. Recent studies suggest that ADP software costs alone, including that used by AF contractors,

COMPUTER FORECASTS—Hemispheric meteorological charts are produced by Air Force Global Weather Central on a huge plotter from information received from a computer.
(U.S. Air Force Photo)

may exceed $1 billion for the Air Force each year. Thus, ADP-related costs constitute a significant element of the Air Force budget and continue to grow each year.

During the early sixties, the Air Force embarked on a course of developing standard data systems for worldwide use in order to lower costs and conserve resources. Today, our Standard Base System provides on-line, three-second computer system response to the base supply function. The system has saved more than 8,900 manpower spaces and has led to an inventory reduction with subsequent savings of more than $585 million for the Air Force. Another standard system supporting Air Force functions worldwide is the Air Force Base Level Standardization Program. That program provides B3500 on-line, third-generation computer support at 127 installations—a multi-user system supporting all functions at base level. Those standard systems are developed and maintained by Air Force Data Systems Design Centers.

One of the most ambitious Air Force projects is the Advanced Logistics System (ALS) now under development. The project will modernize the Air Force wholesale logistics operation from both the conceptual and ADP points of view. The system will tie computers at five Air Materiel Areas and at the Air Force Logistics Command Headquarters together in a network. The new system will be transaction- and inquiry-oriented and will eliminate serial processing of data. The system will access up to 20 billion characters of information at each site and handle up to 600 remote stations per site. Benefits envisioned for the system include a reduction of 3,600 manpower positions and savings of over $142 million over the life cycle of the system.

The above examples suggest some of the benefits which computers have provided to the Air Force.

The expanding scope data automation encompasses has involved the Air Force in many new and sometimes foreign fields of endeavor. A major project still in the planning stage is the New Generation Military Hospital. We are designing a DoD prototype automated hospital with the goal of improving the efficiency of health care delivery. The system will be heavily dependent upon computers. Doctors' and nurses' orders will be placed in the data base, medication will be scheduled, and results analyzed by computer. Information transfer throughout the hospital will be accomplished, to a great extent, without paper.

In addition, we are vigorously pursuing plans for addressing the future. They include a current study—STALOG—of the base-level logistics function, and SADPR-85, which will examine the alternatives for satisfying, through the 1980s, Air Force's ADP requirements below the major command headquarters. Current ADP and communications technology suggest some interesting possibilities.

Of even greater importance is the potential for computer technology to make more direct contributions to the operational capability of the Air Force. Computer management has traditionally been concentrated in the support area. Data automation designers have systematically addressed the broader challenge of ADP components of weapons systems. The future has in store completely digital avionics and weapons delivery systems. These computers will have significant impact upon Air Force resources outside the weapons systems. Interface, programming, system support and compatibility become significant ADP challenges which must be addressed early in the development cycle.

Our emphasis and overriding goal in all of these areas is to ensure operational economy consistent with operational needs. That is our challenge and I firmly believe that the future of data automation in the operational area will yield benefits that will far surpass those already achieved in other supporting areas.

This young Navy lieutenant is a computer system maintenance programmer for the Atlantic Fleet Commander-in-Chief, Norfolk, Virginia.
(U.S. Navy Photo)

Broad Spectrum of Functions

Growth, Change Highlight Navy's ADP

By Rear Admiral Frank S. Haak, USN
Director, Information Systems Division
Office of the Chief of Naval Operations

Consistent with the experience of other leaders in the application of computers, the Navy's efforts in the field of Automatic Data Processing (ADP) have been characterized by rapid growth and dynamic change. In 1967, the Navy ADP Program employed 16,794 military and civilian personnel to support the operation of 800 computers with an annual budget of $220.1 million. In 1973, the Program involves 17,388 personnel, 1,105 computers and a budget of $335.4 million.

Navy computers support a broad spectrum of functions, ranging from business logistics to telecommunications, intelligence information processing, and command and control. Navy personnel administration and financial management rely heavily upon computer-based information systems. In the logistics area, the Navy Material Command is actively implementing DoD-wide Military Standard Systems (MILSTRIP, MILSCAP, etc.) along with uniform systems to serve the needs of functional managers at headquarters and field activities.

The installation of new standard computers to support the Worldwide Military Command and Control System (WWMCCS) provides Navy-supported Unified Commanders and Fleet Commanders-in-Chief with enhanced com-

MECHANICAL MEMORY—A Navy data processing technician aboard the destroyer tender USS Shenandoah uses a computer to monitor work performance of the ship's personnel.
(U.S. Navy Photo)

mand and control capabilities. Computer systems are also supporting the tactical, logistic and administrative requirements of afloat commanders and operating fleet units.

Specific applications of computer technology in the Navy are as varied as the classes of user-activities.

For example, large-scale computers are employed in automated systems for inventory control and supply support to the fleet, for management of naval shipyards, and for control of the aircraft rework process.

Some other current uses include:

- Computer-assisted instruction at the U.S. Naval Academy and fleet training schools;
- Automated laboratory measurement and analysis support in Navy hospitals;
- Weather analysis and prediction on both local and global scales; and
- Computer-based sensing and analytic support in the Navy's development laboratories.

Computers have stimulated a variety of creative solutions to information processing problems throughout the Navy, and the successful applications of automation techniques have led commanders and managers to rely increasingly upon ADP systems for assistance in performing their assigned missions. Furthermore, experience acquired by users of ADP systems has frequently permitted significant improvements in management methods and procedures to be identified and incorporated into follow-on versions of the systems. These conditions have accounted largely for the steady growth of the Navy's ADP Program but that very growth illuminates the need for sound management of ADP resources which represent a substantial dollar value.

The goal of Navy ADP program management is to support operating commanders and functional managers by providing them with effective automated system capabilities which give the best possible payoff in the performance of their missions at the lowest overall cost to the users and to the Navy. Consistent with the Defense Department ADP management objectives promulgated in January 1973, the Navy's management approach is to foster active participation by top-level management with ADP systems users, developers and operators in a comprehensive planning discipline which addresses the key steps and economics of life-cycle support. Interchange of planning information permits early recognition of opportunities for appropriate standardization and sharing of similar applications and for avoiding unnecessary and costly duplication of effort. Plans provide measurable ADP systems objectives, methods for monitoring actual versus planned performance, periodic management reviews and certifications for continuation of systems development along with economic analyses. **The Navy's first 5-year ADP Plan will be published in the near future to make visible the major goals and planned actions to be undertaken within the Navy during this time frame.**

The Director, Department of the Navy ADP Management, as coordinator of Navy ADP Program actions, provides staff support to the Assistant Secretary of the Navy (Financial Management) in the review and approval of proposed ADP Program goals and planned actions.

The Naval Audit Service provides assistance in validating requirements for ADP support and measuring the degree of effectiveness that automated systems achieve in fulfilling objectives.

One example of the Navy's major planned actions is to evaluate the potential benefits to users and cost savings which result from economies of scale in large computing facilities. An ADP service center test is being conducted in the Norfolk, Virginia, area to determine the advantages of a single source of data processing support for area users. Preliminary results of this test indicate substantial potential for savings in ADP resources, but user acceptance is the ultimate criterion.

The Navy is actively pursuing measures in the ADP field which satisfy current mission requirements in a climate of resource limitations, which represent prudent investments in ADP systems that will meet future performance requirements, and which facilitate effective, user-oriented ADP management actions to coordinate the transition toward the uncertain future of the dynamically changing ADP environment.

Current Status of Army Standard Automated Systems

Function	Code Name	Total Sites	Operational Sites	Future Plans
Installation Management	BASOPS I	44	39	Complete Extension by Oct. 1973 [1]
National Inventory Control Points	ALPHA	7	2	Complete Extension by Nov. 1974
CONUS Depots	SPEEDEX	11	11	Fully Operational
Test and Evaluation Activities	TEAM-UP	15	15	Fully Operational
Theater SEA (Air) Port Operations	TOMS	5	2	Complete Extension by Nov. 1973
Commissaries	ASAC	102	100	Complete Extension by Oct. 1973
European Logistics	MATCOM	3	3	Fully Operational [2]
Pacific Logistics	3S	5	5	Fully Operational [2]
Support Districts (Europe)	TASDIST	11	11	Fully Operational
Direct Support Units	DSU/GSU	90	90	ADPE Upgrade to be Completed by Apr. 1975
Division Logistics	DLOGS	12	12	Fully Operational [3]
Division Personnel Management	PERMACAP	22	22	Fully Operational [3]
Reserve/National Guard Divisions and Brigades	RCMIS	18	3	Complete Extension by Apr. 1974
National Guard State Headquarters	ARNGMIS	52	27	Complete Extension by Dec. 1973
Authorization Document System	VTAADS	17	2	Complete Extension by Jan. 1974
Corps of Engineers	COEMIS	42	32	Complete Extension by Sep. 1974
General Hospitals	MEDMIS	8	8	Fully Operational [4]
Military Pay	JUMPS	1	1	Fully Operational
Administration of Service Schools	CONEDS	22	5	Complete Extension by Apr. 1975
Worldwide Communication Maintenance	ACCLAIMS	4	4	Fully Operational
Transportation Operations	AUTOSTRAD	3	3	Fully Operational
Continental Army Operations	CARMOCS	6	6	To be Discontinued Apr. 30, 1974
Command and Control	WWMCCS	10	10	Fully Operational—ADPE Upgrade to be Completed by July 1974 [5]
Intelligence Operations	IDHS	10	8	Complete Extension by July 1974 [5]
Scientific and Engineering Systems	AMC S&E	16	16	Fully Operational—Now Being Converted to a Regional Time Share System
New Systems				
Combat Service Support (Divisions and Corps)	CS_3	11	2	Fully Operational by Mar. 1974 [6]
Worldwide Military Personnel Management	SIDPERS	52	3	Complete Extension by Aug. 1975
Base Operations Supply	SAILS AB	49	1	Complete Extension by Apr. 1975
Theater Level Supply Management	SAILS A-	2	0	Complete Extension by Nov. 1974
Overseas Depots	SAILS B	7	0	Complete Extension by Early 1975
Enlisted Personnel and Assignment Training Reservations	REQUEST	91	7	Complete Extension by Oct. 1973
Data Banks				
Collection and Evaluation of Logistic Data	LSSA	2	2	Fully Operational
Major Item Management	MIDA	1	1	Fully Operational
Worldwide Maintenance	LDC	1	1	Fully Operational
Cataloging Data	AMCCDO	1	1	Fully Operational
International Logistics	USAILSC	1	1	Fully Operational
Overseas Logistics	LCO-P	1	1	Fully Operational
DA Logistics Management	DDPC	1	1	Fully Operational
DA Personnel Management	MILPERCEN	1	1	Fully Operational—ADPE Upgrade To be Completed May 1974 (70X)
National Guard Management	NGCC	1	1	Fully Operational
Army Staff Management	USAMSSA	1	1	Fully Operational
DA Financial Management	USAFSA	1	1	Fully Operational
CONUS Major Commands	FORSCOM/ TRADOC	2	2	Fully Operational
Army Reserves Management	RCPAC	1	1	Fully Operational

Army ADP systems are designed to support management activities in 30 functional areas and are deployed worldwide. An active program of developing and extending standard systems has been under way since July 1970. When completed, the number of Army systems will be reduced to 23 standard systems with compatible functional procedures and training.

[1] To be Upgraded by SAILS AB and SIDPERS
[2] To be Replaced by SAILS A-
[3] To be Replaced by CS3
[4] To be Replaced by BASOPS at 7 Installations
[5] Will Become a Single Standard System
[6] Includes SIDPERS

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Subscription Price: $4.50 domestic per year; $1.25 additional for foreign mailing; 10 cents per single copy.
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